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Plasma Properties of Microwave Produced Plasma in a Toroidal Device AJAY SINGH, W.F. EDWARDS, ERIC HELD, Physics Department, Utah State University, Logan, UT 84341 — We have modified a small tokamak, STOR-1M, on loan from University of Saskatchewan, to operate as a low-temperature ($\sim$5 eV) toroidal plasma machine with externally induced toroidal magnetic fields ranging from zero to $\sim$50 G. The plasma is produced using microwave discharges at relatively high pressures. Microwaves are produced by a kitchen microwave-oven magnetron operating at 2.45 GHz in continuous operating mode, resulting in pulses $\sim$0.5 s in duration. Initial measurements of plasma formation in this device with and without applied magnetic fields are presented. Plasma density and temperature profiles have been measured using Langmuir probes and the magnetic field profile inside the plasma has been obtained using Hall probes. When the discharge is created with no applied toroidal magnetic field, the plasma does not fill the entire torus due to high background pressure. However, when a toroidal magnetic field is applied, the plasma flows along the applied field, filling the torus. Increasing the applied magnetic field seems to aid plasma formation - the peak density increases and the density gradient becomes steeper. Above a threshold magnetic field, the plasma develops low-frequency density oscillations due to probable excitation of flute modes in the plasma.

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